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NEW WORK IN THE MALAY ARCHIPELAGO.

Reisen in den Molukken, in Ambon, den Uliassern, Seran (Ceram) und Buru. Geologischer Theil. By Prof. K. Martin. Pp. x+296. (Leyden: Successors of E. J. Brill, 1903.)

EVER since Dr. A. R. Wallace revealed the organic treasures of the Malay Archipelago, zoologists have found in this or that island a rich and fascinating field. Following the path indicated by the master-pioneer, they have made these relics of equatorial land serve as a "public park" of philosophical zoology. The geologists, though often appealed to, have been forced to move more slowly, since the very vegetation which preserves the fauna has effectually concealed the junctions of the various types of rock. We have recently (NATURE, vol. lxvii. p. 506) had occasion to discuss the arduous researches of Molengraaff among the forests and water-ways of Borneo. Prof. Martin meets with similar difficulties in the smaller isles of the Moluccas. He remarks that the rivers are often known only by their mouths; and, while he walks across some of the central ridges, he can rarely study what lies to right or left. His maps show what lies along the shore, or on his traverses from coast to coast, and in the case of Buru (p. 215), an island larger than Kent, he has added a good deal to the previously known topography.

Work of this kind has naturally been spread over some years, and the first part of the volume is reprinted from that published in 1897. This might, we think, have been shown upon the title-page, so as to prepare the reader for comments and corrections inserted in the later portion. From p. 49 to p. 54, for example, considerable stress is laid on the recently volcanic character of Wawani, in Amboina, in which Wallace also believed. Prof. Kotô, of Tokio, criticised our author's conclusions so far back as 1899 (*Journ. Coll.* of Science, Tokio, vol. xi. p. 96), and on p. 281 of the present work the supposed evidence of an eruption in 1674 is withdrawn. Some modification of p. 64 also occurs, and the prolongation of the volcanic line of the Talaur Islands and Ternate into Amboina is rejected. So far as the relations of the lines of present eruption and of earth-folding are concerned, we are left, it seems, with Kotô's general map as our most recent guide.

In working out the specimens collected, Prof. Martin has had the help of Dr. Schroeder van der Kolk for the petrography, and of Dr. Rüst for the interesting radiolarian series. The book opens with a description of Amboina and its eastern neighbours, a region occupied more than once by England, and ceded again to Holland as recently as 1814. While largely composed of volcanic material, these islands have been raised above the sea in late Tertiary or Quaternary times. The cracks in the peridotites of Amboina contain modern sandstone with marine remains, while coral-limestone occurs high and dry inland. Even the natives (p. 37) have included this material, with its surface bored and roughened by solution-hollows, under the name "Karang," which they apply to the lower masses so familiar to them along the coast. Here and there only loose blocks remain to prove the former continuity of the reefs across their volcanic basis. "Karang" occurs in the peninsula of Leitimor at a height of 480 metres above the sea. In Saparua (p. 48) there is some evidence of an upward movement at the present day. The main uplift appears, indeed, to have occurred after the reefs had completely buried the earlier masses, since detritus from the latter is not found in the inland "karang."

Prof. Martin believes, moreover, that the eruptions along this east-and-west line were originally submarine, the rapid cooling of the lavas furnishing an unusual amount of glass. In this matter we find an interesting parallel with Mr. Guppy's conclusions as to the Fijis (NATURE, vol. lxix. p. 31). The volcanic rocks consist of various types of andesite and dacite, including at times patches of quartz, cordierite, and garnet, which Dr. Ferdinand von Wolff (p. 102), with great probability, considers to be derived from the cordierite-gneisses that occur among the basal rocks of the Moluccas. Prof. Martin points out (pp. 21 and 93) that the discovery of rolled blocks of gneiss and schist in any given island may be due merely to the carrying up of portions of the old ground in the volcanic masses that broke through it.

The author relies too much on the nature of his igneous rocks in assigning to them a geological age, especially when (p. 37) he determines a radiolarian limestone as Tertiary because it is later than "Neo-volcanic" lavas. This classification was, however, common at the time when he started on his labours. While adding greatly to our knowledge of these rocks, he is able to correct Wallace in regard to Buru, Tomahu, and some other islands, in which he is unable to recognise a volcanic character. Hot springs still arise in Nusalaut, accompanied by deposits of aragonite. The considerable extent of the author's researches is to be seen in Map iii., from Nusalaut to the west of Amboina, where his conjectures are distinguished by shading from the ground actually observed.

The second part of this handsome memoir deals with Seran (Ceram) and the little north-western island of Buano. Ichthyosaurus is already known from Seran, and Prof. Martin regards certain globigerina limestones and flinty deposits as Mesozoic (p. 141). The latter, rich in radiolaria, are probably representatives of Molengraaff's Danau series in Borneo, and also of deep-sea origin. The associated fragments of calcareous algæ may have come from shallower marine banks, and prove nothing as to the nearness of a shore (p 138).

Besides these fossiliferous deposits, considerable interest attaches to the mica-schist and mica-slate which form the prevalent rocks of the hills of southern Seran, and which at times determine its surface features by their strike. Cordierite occurs both in the schist and in the associated gneiss. A massive "grauwacke" formation represents in part the interval between these rocks and the limestones.

The concluding section describes Buru, an island

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lying at the west end of the tectonic line which curves about the Banda Sea. Here again radiolarian flint occurs, as nodules or thin beds in a massive limestone, unconformably overlying "grauwacke." Globigerina beds assist in assigning to this "Buru limestone" a true deep-sea character. Mesozoic molluscan species are known from the later limestones. Typical karang does not seem to have formed freely across the old crystalline rocks of Buru, which remain exposed over a wide area. A consideration of the coast-lines, and of the level nature of the karang formation, leads the author to conclude that the Moluccan region is one of fault blocks and vertical movements (p. 286) rather than of folding. He agrees with Verbeek and with most observers in the Indo-Pacific area that uplift and subsidence of adjacent land masses, and not the retreat of the waters, must be held accountable for the present relations of island-crest and ocean-floor.

A noteworthy feature of Prof. Martin's work is the frequent reference to the soils derived from various types of solid rock. This alone would show the careful spirit in which he has made his observations. As he freely remarks, detail after detail remains to be filled in; but his maps, drawn on a liberal scale, his sections, and the photographic landscapes, give the reader a clear insight into what his journeys have revealed. The Dutch Government, in assisting the publication of the results, has conferred a benefit on geographers as well as on geologists.

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ANOTHER ATTACK UPON DARWINISM.

Mimicry, Selektion, Darwinismus. By M. C. Piepers, Dr. jur. utr. Pp. 452. (Leyden: Brill, 1903.)

THE theory that natural selection is an important if not an all sufficient explanation of the evolution of animals and plants has had to meet the attacks of a few serious and of many frivolous critics. To the former class belongs Dr. Piepers. We may not approve of his methods or agree with his conclusions, but his wide learning, his special knowledge of a single group of animals—the Lepidoptera—and his laborious efforts to disprove the current theories of evolution are sufficient to justify us in classifying him with the serious critics. Many will, doubtless, shrink from the task of reading with care the four hundred pages of closely written text, without illustration, with which his attack is framed and delivered, but every naturalist who has the courage to do so will find in it a great deal of instruction and—may we add without offence?—no little amusement. I would suggest to those who attempt the task to disregard, if possible, certain features of the work which disfigure the text.

The denunciation of modern theories with such expressions as the "mimicry humbug," the "heresies of modern biological science" and "phantasies"; the unmannerly denunciation of such naturalists as Weismann, Wallace, Bates and Poulton; the description of the unwholesome character of the English race which produced and encouraged a Darwin (p. 397), are unusual in a work of permanent scientific value. Nevertheless, the pages are filled with many facts bearing upon the theories of mimicry and protective resemblance which will certainly be of value to the serious student of natural history, whatever his preconceived ideas may be.

To quote one of the many interesting facts bearing upon the questions in dispute, we find on p. 22:—

> "Ich habe selbst einen meiner javanischen Raupensucher, obwohl er das Thier selbst gefangen hatte, plötzlich erschreckt die Hand zurückziehen sehen, als eine Raupe von Hebomoia glaucippe L. die er mir zeigen wollte, ihre Schlangen-Mimicry annahm, und das wiewohl diese Raupe viel kleiner ist als die der Chaerocampa- und Parechidnia-Arten, die sich mehr der Grösse von kleinen Schlangen nähern, und deren Aehnlichkeit dadurch auch noch viel stärker ist."

It may seem incredible that a naturalist who has had the valuable experience of observing such interesting examples of mimicry as this can doubt the utility to the species of pronounced mimetic resemblance to poisonous or dangerous animals, but Dr. Piepers explains the resemblance in another way, and denies its protective value.

Some years ago Wasmann described a remarkable resemblance between an ant of the genus Eciton and a beetle which dwells in its nest belonging to the genus Mimeciton. If we deny, as Dr. Piepers does, that this is a true case of mimicry, it must be due either to an independent convergence of evolution (homeogenesis) or to a similarity in development caused by a similarity of external influences. But it is impossible to conceive that either of these explanations can account for such a close resemblance, even in the details of the antennæ, as this ant and this beetle exhibit. Surely, as Wasmann remarks, the old theory of special creation is more reasonable than either of these.

At the time the book was written, Dr. Piepers had probably not seen the very remarkable paper by Mr. Shelford on mimetic insects from Borneo and Singapore which was read before the Zoological Society in London on November 4, 1902. In this paper so many examples are given of insects and spiders that closely resemble other insects and spiders with which they associate that the theory of homeogenesis must be strained to the breaking point to account for them. There may be some justice in the remark that the experimental evidence is not sufficient to prove the theory of the origin of mimetic resemblance by natural selection; but what evidence of any kind can be brought to support the theory of homeogenesis, or the startling effects produced in mimicry by similar environments? Absolutely none. The impartial reader must be struck in reading these lengthy theses with the fact that singularly little experimental evidence is related in the text, and none that really supports the truth of any theory but that of natural selection. There is plenty of destructive criticism of current theories, there are many weighty objections and difficulties suggested, but if these succeed in destroying Darwinismus there is nothing left in the way of theory that has any basis of support. But there is a little evidence of a direct nature which our author has overlooked that supports the theory of natural selec-

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